WHAT IS CLAIMED:

1. A process for producing a silane-crosslinked thermoplastic polymer comprising:

a) providing a mixture of:

(i) at least one silane possessing an unsaturated organic function;

(ii) at least two free radical initiators, the first initiator having a first half-life temperature and the second initiator having a second half-life temperature being higher than said first half-life temperature;

(iii) at least one thermoplastic polymer; and,

b) reacting the mixture of step (a) under reactive mechanical-working conditions and exposure to moisture to provide crosslinked polyolefin.

2. The process of Claim 1 wherein the thermoplastic polymer is at least one polyolefin selected from the group consisting of high-pressure low-density polyethylene, medium/low-pressure high-density polyethylene, low-pressure low-density polyethylene, medium-density polyethylene, an ethylene-α-olefin copolymer, polypropylene, an ethylene-ethyl acrylate copolymer, an ethylene-vinyl acetate copolymer, an ethylene-propylene copolymer, an ethylene-propylene-diene terpolymer, an ethylene-butene copolymer, polymethyl-pentene-1, polybutene, chlorinated polyethylene, an ethylene-vinyl acetate-chlorine terpolymer, and the like, and mixtures thereof.

3. The process of Claim 1 wherein the silane possesses the general formula $RR'SiY_2$ wherein R represents a monovalently olefinically unsaturated hydrocarbon or hydrocarbonoxy radical, each Y represents a hydrolysable organic radical and R represents an R radical or a Y radical.

4. The process of Claim 3 wherein the R radical or the Y radical is selected from the group consisting of vinyl, allyl, butenyl, cyclohexenyl, cyclopentadienyl, cyclohexadienyl,

$$CH_2=C(CH_3)COO(CH_2)_3—,$$

$$CH_2=C(CH_3)COOCH_2CH_2O(CH_2)_3— \text{ and}$$

$$CH_2=C(CH_3)COOCH_2CH_2OCH_2\underset{\displaystyle OH}{\underset{|}{C}}HCH_2O(CH_2)_3—.$$

5. The process of Claim 3 wherein the group Y represents a hydrolysable organic radical selected from the group consisting of alkoxy radicals, acyloxy radicals, oximato radicals and amino radicals.

6. The process of Claim 3 wherein the silane is vinyl triethyoxysilane and/or vinyl trimethoxysilane.

7. The process of Claim 1 wherein the 0.1 hour half-life temperatures of the first free radical initiator is from about 80° to about 160°C.

8. The process of Claim 1 wherein the 0.1 hour half-life temperatures of the first free radical initiator is from about 90° to about 155°C.

9. The process of Claim 1 wherein the 0.1 hour half-life temperature of the second free radical initiator is from about 125° to about 190°C.

10. The process of Claim 1 wherein the 0.1 hour half-life temperature of the second free radical initiator is from about 140° to about 170°C.

11. The process of Claim 7 wherein the first free radical initiator is selected from the group consisting of di (2,4-dichloro benzoyl) peroxide, tert-butyl peroxypivalate, dilauroyl peroxide, dibenzoyl peroxide, tert-butyl peroxy-2-ethylhexanoate, 1,1 di(tertbutylperoxy)-3,3,5-trimethylcyclohexane, di(tertbutylperoxy) cyclohexane, tert-butyl peroxy-3,5,5-trimethylhexanoate, tert-butyl peroxyacetate, tert-butylperoxybenzoate, di-tert-amyl peroxide, dicumyl peroxide, di(tert-butylperoxyisopropyl)benzene and 2,5-dimethyl-2,5-di(tert-butylperoxy)hexane.

12. The process of Claim 9 wherein the second free radical initiator is selected from the group consisting of tert-butyl peroxyacetate, tert-butylperoxybenzoate, di-tert-amyl peroxide, dicumyl peroxide, di(tert-butylperoxyisopropyl)benzene, 2,5-dimethyl-2,5-di(tert-butylperoxy)hexane, tert-butyl cumyl peroxide, 2,5-dimethyl-2,5-di(tert-butylperoxy)hexyne-3 and di-tertbutylperoxide.

13. The process of Claim 1 wherein mixture (a) further includes at least one additional component selected from the group consisting of catalysts, stabilizers, fillers, antioxidants, processing aids, oils, plasticizers, pigments and lubricants.

14. The crosslinked polyethylene produced by the process of Claim 1.

15. The crosslinked polyethylene produced by the process of Claim 2.

16. The crosslinked polyethylene produced by the process of Claim 3.

17. The crosslinked polyethylene produced by the process of Claim 4.

18. The crosslinked polyethylene produced by the process of Claim 5.

19. The crosslinked polyethylene produced by the process of Claim 6.

20. The crosslinked polyethylene produced by the process of Claim 7.

21. The crosslinked polyethylene produced by the process of Claim 8.

22. The crosslinked polyethylene produced by the process of Claim 9.

23. The crosslinked polyethylene produced by the process of Claim 10.

24. The crosslinked polyethylene produced by the process of Claim 11.

25. The crosslinked polyethylene produced by the process of Claim 12.

26. The crosslinked polyethylene produced by the process of Claim 13.

27. A composition comprising:

(i) at least one silane possessing an unsaturated organic function;

(ii) at least two free radical initiators, the first initiator having a first half-life temperature and the second initiator having a second half-life temperature, said second half-life temperature being higher than said first half-life temperature;

(iii) optionally one or more condensation catalysts;

(iv) optionally, one or more stabilizers, stabilizer packages, inhibitors or free radical scavengers; and,

(v) optionally, other additives such as fillers, colorants, processing aids, etc.